CLAIMS

1. A lithographic process for forming a pattern (20) in relief on a mass (10) of polymeric material comprising the steps of:

preparing the said mass (10) of polymeric material and a die (12) having a surface region (14) facing towards the said mass (10) of polymeric material and which reproduces in negative the said pattern in relief (20),

heating the said die (12) and putting the said mass (10) of polymeric material into contact with the die (12) in any temporal sequence in such a way that the parts of the said mass (10) of the polymeric material in contact with the said surface zone (14) are subject to softening, and

separating the said die (12) from the mass (10) of polymeric material on the surface of which the said pattern in relief (20) has been formed,

the said process being characterised by the fact that the heating of at least part of the die (12) is obtained by the generation of thermal energy upon dissipation of another form of energy in at least one region (16) of the said die (12).

2. A process according to Claim 1, characterised in that the said mass (10) of polymeric material has a three-dimensional form.

3. A process according to Claim 1, characterised in that the region (16) in which energy is dissipated with consequent generation of heat is at a smaller distance than 100 μm from the surface carrying the pattern in relief of the said die (12).

4. A process according to Claim 1, characterised in that the said mass (10) of polymeric material has a two-dimensional form and is in the form of a sheet or thin film deposited on a substrate (22).

5. A process according to any preceding claim, characterised in that the region (16) of the said die (12) in which thermal energy is generated remains for less than 25 seconds, preferably less than 50 milliseconds, at a temperature greater than or equal to the glass transition temperature of the polymeric material (10).

6. A process according to any preceding claim, characterised in that it includes a plurality of successive cycles of heating, contacting and separation.

7. A process according to any preceding claim, characterised in that the heating phase includes a plurality of short successive cycles in such a way that the impression of the pattern is the result of a series of successive indentations of the die (12).

8. A process according to any preceding claim, characterised in that the steps of heating the region (16) of the die (12) and contacting it with the mass (10) of polymeric material are synchronised.

9. A process according to any preceding claim, characterised in that the said die (12) is put into contact under pressure with the mass (10) of polymeric material.

10. A process according to Claim 9, characterised in that the said pressure is exerted in a pulsed manner.

11. A process according to claim 9 or Claim 10, characterised that the said pressure is obtained mechanically, or with electrostatic, magnetic, electromagnetic forces and/or with acoustic shock waves.

12. A process according to any preceding claim, characterised in that the said die (12) is pre-heated to a desired temperature.

13. A process according to any preceding claim, characterised in that the quantity of thermal energy generated varies locally within the said region (16) of the die (12).

14. A process according to any preceding claim, characterised in that the said polymeric material (10) is of thermoplastic type.

15. A process according to Claim 14, characterised in that the said polymeric material (10) is chosen from the group consisting of polycarbonates, polymethylmethacrylates, polyethylene terephthalates, polyethylmethacrylates, polybutylene terephthalates, polyolefins and their mixtures.

16. A process according to any preceding claim, characterised in that at least one portion of the surface of the die (12) is clad with a release agent.

17. A process according to any preceding claim, characterised in that , after the pattern (20) in relief has been formed on the surface of the mass (10) of polymeric material, a treatment is performed with an attack agent so as

to remove the polymeric material (10) where it has been compressed.

18. A process according to any preceding claim, characterised in that the surface region (14) of the die (12) which reproduces the pattern in relief in negative is aligned with pre-existing reference signs on the mass (10) of polymeric material or, if the said material (10) is a thin film, on the substrate (22) on which the said film is deposited.

19. A process according to any preceding claim, characterised in that the said region (16) of the die (12) in which thermal energy is generated is of electrically conductive material.

20. A process according to Claim 19, characterised in that the energy dissipated in heat is provided by an electric current (18) which flows in the said electrically conductive material.

21. process according to Claim 20, characterised in that the direction of flow of the said electric current (18) is substantially perpendicular to the direction of relative movement of the mass (10) of polymeric material and the die (12).

22. A process according to any preceding claim, characterised in that the said region (16) of the die (12) in which thermal energy is generated coincides with the said surface region (14) which reproduces the said pattern in relief in negative.

23. A process according to any preceding claim, characterised in that the said region (16) of the die (12) in which thermal energy is generated is in the form of a layer.

24. A process according to Claim 23, characterised in that the said layer has a thickness less than 2 μm.

25. A process according to Claim 23 or Claim 24, characterised in that the said layer has a non-uniform thickness in such a way that it is possible locally to vary the quantity of thermal energy generated.

26. A process according to any preceding claim from 1 to 22, characterised in that the said die (12) is entirely made of electrically conductive material.

27. A process according to any preceding claim from 19 to 26, characterised in that the said electrically conductive material is a metal, preferably chosen from the group consisting of Ti, Ni, Cr, Cu, Ag, Au, W, Ir, Ta, Pd, Mo, V and their alloys.

28. A process according to any preceding claim from 19 to 26, characterised in that the said electrically conductive material is a semi-conductor, preferably silicon.

29. A process according to any preceding claim from 23 to 25, characterised in that the said layer of electrically conductive material is obtained by doping a surface layer (16) of an intrinsically semiconductive or initially lightly-doped substrate, in such a way as to increase its conductivity with respect to the underlying portion (24) of the substrate.

30. A process according to Claim 29, characterised in that the said layer (16) to be doped is the outermost layer of silicon of a silicon-on-insulator (SOI) structure.

31. A process according to Claim 29, characterised in that the doping operation is performed by ion implantation.

32. A process according to Claim 1, characterised in that the said region (16) of the die (12) in which thermal energy is generated is located within the die (12).

33. A process according to any preceding claim from 20 to 32, characterised in that the said electric current (18) is induced by applying a potential difference between at least two electrodes (26) connected to the said electrically conductive material.

34. A process according to any preceding claim from 20 to 32, characterised in that the said electric current (18) is induced by a variable magnetic field.

35. A process according to any preceding claim from 1 to 18, characterised in that the said region (16) of the die (12) in which thermal energy is generated is of dielectric material.

36. A process according to Claim 35, characterised in that the energy dissipated in heat in the said region (16) of the die (12) is provided by electromagnetic radiation, preferably microwaves (28).

37. A die for performing a process according to any preceding claim, comprising at least one region (16) capable

of generating thermal energy upon dissipation of another form of energy.

38. A die according to Claim 37, further including an inner thermally insulating layer.